

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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NOTIFICATION OF TRANSMITTAL OF
INTERNATIONAL PRELIMINARY EXAMINATION
REPORT

(PCT Rule 71.1)

ALC

To:

Davies Collison Cave
Level 15
1 Nicholson Street
MELBOURNE VIC 3000

Date of mailing 30 JUL 2004
day/month/year

Applicant's or agent's file reference
12268420/ALC/alp

IMPORTANT NOTIFICATION

International Application No. PCT/AU2003/000318	International Filing Date 17 March 2003	Priority Date 19 April 2002
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Applicant
METAL STORM LIMITED et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide

Name and mailing address of the IPEA/AU

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PATENT COOPERATION TREATY
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 12268420/ALC/alp	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. PCT/AU2003/000318	International Filing Date (day/month/year) 17 March 2003	Priority Date (day/month/year) 19 April 2002
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ F42B 5/16, 14/00, 30/00		
Applicant METAL STORM LIMITED et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 7 sheet(s).

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17 November 2003	Date of completion of the report 22 July 2004
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer JEFFREY CARL Telephone No. (02) 6283 2543

I. Basis of the report**1. With regard to the elements of the international application:***

- ☐ the international application as originally filed.
- ☒ the description, pages 1-10, as originally filed,
pages , filed with the demand,
- ☒ the claims, pages 11, 12, as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
page 13, received on 16 December 2003 with the letter of 16 December 2003
pages 14, 17-19, received on 19 April 2004 with the letter of 19 April 2004
pages 15, 16, received on 19 July 2004 with the letter of 19 July 2004
- ☒ the drawings, pages 1/5-5/5, as originally filed,
pages , filed with the demand,
- ☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

The international preliminary examination report has been drawn up in respect of the entire international application but the International Preliminary Examining Authority is of the opinion that the application does not appear to comply with the requirements of unity of invention as set forth in the PCT regulations (Article 34(3), Rule 68(1) PCT).

The separate groups of invention are:

1. Claims 1-21 directed to projectile sealing arrangements and projectile assemblies for a plurality of axially disposed abutting projectiles, the projectiles being characterised by the forward portion of a trailing projectile being in operative sealing engagement with a recess in the trailing portion of a leading projectile.
2. Claims 22-64 directed to a chain of projectiles, and a projectile for such a chain, the chain including at least two projectiles held together by a frangible coupling, wherein the trailing projectile has a head portion for engagement with a complementary surface in the tail portion of the leading projectile.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-64	YES
	Claims	NO
Inventive step (IS)	Claims 1-64	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-64	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

The following documents identified in the International Search Report have been considered for the purposes of this report:

(i) GB 1594686	(v) AU 200045232
(ii) AU 62790/94	(vi) AU 200035451
(iii) AU 76309/98	(vii) US 3854231
(iv) US 2099993	

NEW CITATIONS

(viii) US 5936189	(x) US 4892038
(ix) US 4938146	(xi) US 2313030

Claims 1-21: The invention defined in these claims is directed to projectile sealing arrangements, a barrel assembly including a plurality of projectile assemblies and a projectile assembly wherein all arrangements and assemblies are characterised by a projectile sealing arrangement that, during the application of a compressive load to abutting projectile assemblies, a discrete propellant charge for the trailing projectile is sealed within a cavity in the leading projectile.

No individual citation, nor obvious combination of citations, discloses a chain of projectiles having all of these features.

The closest art of citations (i)-(iii) each disclose a plurality of projectiles in axially abutting relationship with each projectile including a discrete propellant charge contained in a rearward opening cavity. There is no suggestion nor disclosure in any citation that the propellant charges are sealed by the application a compressive load.

Claims 22-64: The invention defined in these claims is directed to a chain of projectiles, and a projectile for such a chain, the chain including at least two projectiles held together by a frangible coupling, wherein the trailing projectile has a head portion for engagement with a complementary surface in the tail portion of the leading projectile.

No individual citation, nor obvious combination of citations, discloses a chain of projectiles having all of these features.

The closest art of citations (iv) and (xi) each disclose chains of projectiles having a yieldable coupling between adjacent projectiles. There is no suggestion nor disclosure in either citation that the coupling is frangible.

(See also Box VI)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/AU2003/000318

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
L,X AU 2004100128	19 March 2004	20 February 2004	19 April 2002

This document is an Innovation Patent Application that was filed as a Divisional Patent Application to the present PCT Application. Claims 1-5 of this Innovation Patent Application are identical to claims 22-26 of the present application.

With regard to the document listed in Box VI under "certain documents cited", this is a related document published after the international filing date which could be considered to be of particular relevance.

Under the PCT, novelty is considered only in respect of documents published before the priority date. The relevance of a document published after the priority date is dependent upon national law. Such documents are excluded from consideration in preliminary examination, under the PCT Guidelines but have been included here for information.

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
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projectile relative to a trailing projectile upon application of an axial compressive load to said plurality of projectiles.

13. The barrel assembly of claim 11 wherein propellant charges are in
5 solidified form.

14. The barrel assembly of claim 11 wherein propellant charges are in a flowable form.

10 15. The barrel assembly of either claim 13 or claim 14 wherein the rearward opening includes a closure for retaining the propellant material within the cavity.

16. The barrel assembly of claim 15 wherein the closure comprises a burstable disc or a disc composed of combustible material.

15 17. The barrel assembly of claim 16 wherein said closure includes retaining means for releasable engagement with complementary retaining means on the head portion of an adjacent projectile assembly.

20 18. The barrel assembly of claim 17 wherein said complementary retaining means include a socket member and a spigot member.

19. The barrel assembly of claim 17 wherein said complementary retaining means include cooperating screw threads to facilitate release.

25 20. The barrel assembly of claim 17 wherein the retaining means is frangible.

30 21. A projectile assembly having a body with a head and a tail portion, said projectile assembly characterised in that:

the head includes a forward portion arranged for operative sealing engagement with the rearward opening of a leading projectile;

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the tail portion includes a rearward opening communicating with a cavity provided in the projectile assembly for receiving the discrete propellant charge, which opening includes a rear portion arranged for operative sealing engagement with the forward portion of a trailing projectile; and

5 a sealing arrangement being such that, during the application of a compressive load to abutting projectile assemblies, the discrete propellant charge is sealed within the cavity.

22. A projectile sealing arrangement including at least two projectiles coupled together by a frangible coupling to form a chain, wherein: each projectile has a head
10 portion, a tail portion and a propellant charge, the tail portion of the leading projectile and the head portion of the trailing projectile form a seal around the propellant charge of the leading projectile, and the coupling includes retaining means disposed between the tail portion of a leading projectile and the head portion of a trailing projectile.

15 23. A sealing arrangement according to claim 22 wherein the seal includes contact between complementary surfaces on the leading and trailing projectiles.

24. A sealing arrangement according to claim 22 or 23 wherein the seal includes an adhesive connection between the leading and trailing projectiles.

20 25. A sealing arrangement according to claim 22, 23 or 24 wherein the retaining means includes a threaded connection between the leading and trailing projectiles.

26. A sealing arrangement according to claim 22, 23 or 24 wherein the retaining
25 means includes an adhesive connection between the leading and trailing projectile.

27. A chain of projectiles including at least two projectiles coupled together by a frangible coupling, wherein each projectile has a head portion, a tail portion and a sealed propellant charge, and the coupling includes retaining means disposed between the tail
30 portion of a leading projectile and the head portion of a trailing projectile.

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28. A chain as in claim 27 wherein the retaining means includes complementary spigot means and socket means engaged together.

29. A chain as in claim 28 wherein the spigot means and socket means are threaded
5 together.

30. A chain as in claim 28 or 29 wherein the spigot means and socket means are provided on the trailing and leading projectiles respectively.

10 31. A chain as in claim 28, 29 or 30 wherein either the spigot or the socket is frangible.

32. A chain as in claim 27 wherein the retaining means includes adhesive between the trailing and leading projectiles.
15

33. A chain as in at least one of the claims 27 to 32 wherein the coupling is broken by combustion of the propellant charge in the leading projectile.

34. A chain as in at least one of the claims 27 to 33 wherein the propellant charge is
20 contained in the tail portion of the leading projectile and provides part of the retaining means.

35. A chain as in claim 34 wherein the retaining means includes a socket formed in the propellant charge.
25

36. A chain as in at least one of the claims 27 to 35 formed as a substantially rigid linear arrangement of projectiles with a frangible coupling between each pair of adjacent projectiles.

30 37. A chain as in at least one of the claims 27 to 36 wherein each projectile is an assembly of separate components.

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38. A chain as in at least one of the claims 27 to 37 wherein the tail portion of the leading projectile and the head portion of the trailing projectile have complementary surfaces that make contact to form a seal around the propellant charge in the leading
5 projectile.

39. A chain as in at least one of the claims 27 to 38 wherein all of the projectiles are substantially identical.

10 40. A chain as in at least one of the claims 27 to 39 wherein the propellant charge in each projectile is ignitable to propel the respective projectile from the barrel of a weapon.

41. A projectile for a chain of projectiles, having a head portion, a tail portion and a propellant charge, the head and tail portions having sealing means that form respective
15 propellant seals, and having retaining means that form respective frangible couplings, when joined together with a tail portion or a head portion of a leading or trailing projectile in the chain.

42. A projectile according to claim 41 wherein the retaining means includes a spigot
20 in the head portion and a socket in the tail portion.

43. A projectile according to claim 42 wherein either the spigot or the socket is frangible.

25 44. A projectile according to one of the claims 41 to 42 wherein the retaining means of adjacent projectiles are threaded together.

45. A projectile as in one of the claims 41 to 44 wherein each coupling is frangible by virtue of combustion of the propellant charge in the leading projectile.
30

46. A projectile as in one of the claims 41 to 45 wherein the propellant charge is

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contained by the tail portion and provides part of the retaining means.

47. A projectile as in claim 46 wherein the retaining means includes a socket formed in the propellant charge.

5

48. A projectile as in one of the claims 41 to 47 wherein the sealing means includes a sealing surface on the tail portion that contacts a sealing surface on the head portion of a trailing projectile in the chain.

10 49. A projectile as in claim 48 wherein the sealing surface forms a seal with the trailing projectile.

50. A projectile as in claim 49 wherein the seal includes adhesive that forms part of the retaining means.

15

51. A barrel assembly including a barrel containing a chain of projectiles, the chain being held together by frangible couplings between the projectiles, wherein each projectile has a head portion, a tail portion and a sealed propellant charge, and the couplings include retaining means disposed between the tail portion of each leading projectile and the head
20 portion of the respective trailing projectile.

52. An assembly as in claim 51 wherein the retaining means includes complementary spigot means and socket means engaged together.

25 53. An assembly as in claim 52 wherein the spigot means and socket means are threaded together.

54. An assembly as in claim 52 or 53 wherein the spigot means and socket means are provided on the trailing and leading projectiles respectively.

30

55. An assembly as in claim 52, 53 or 54 wherein either the spigot or the socket is

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frangible.

56. An assembly as in at least one of the claims 51 to 55 wherein the retaining means includes adhesive between the trailing and leading projectiles.

57. An assembly as in at least one of the claims 51 to 56 wherein the coupling is broken by combustion of the propellant charge in the leading projectile.

58. An assembly as in at least one of the claims 51 to 57 wherein the propellant charge is contained in the tail portion of the leading projectile and provides part of the retaining means.

59. An assembly as in claim 58 wherein the retaining means includes a socket formed in the propellant charge.

60. An assembly as in at least one of the claims 51 to 59 formed as a substantially rigid linear arrangement of projectiles with a frangible coupling between each pair of adjacent projectiles.

61. An assembly as in at least one of the claims 51 to 60 wherein the tail portion of the leading projectile and the head portion of the trailing projectile have complementary surfaces that make contact to form a seal around the propellant charge in the leading projectile.

62. An assembly as in at least one of the claims 51 to 61 wherein all of the projectiles are substantially identical.

63. An assembly as in at least one of the claims 51 to 62 wherein the propellant charge in each projectile is ignitable to propel the respective projectile from the barrel of a weapon.

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64. An assembly as in at least one of the claims 51 to 63 further including an ignition system for the projectiles.